

Case Report

Delayed visceral ischemia induced by type B aortic dissection

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Case: A 56-year-old man presented with a sudden severe abdominal pain 13 days after the onset of type B acute aortic dissection. Chest computed tomography revealed type B aortic dissection, and the true lumen was narrowed by the expanding false lumen. Blood flow through the celiac trunk, superior mesenteric artery, and left renal artery was reduced. Blood flow through the distal abdominal aorta and bilateral femoral arteries was clearly recognized. Laboratory findings such as transaminases were rapidly worsening.

Outcome: The patient underwent emergency fenestration of the abdominal aorta and recovered without organ failure.

Conclusions: Rapidly worsening laboratory findings led us to emergency operation with successful results. Serial monitoring of laboratory findings is the key for adequate timing of operation.

Key words: acute aortic dissection, aortic fenestration, visceral ischemia

INTRODUCTION

VISCERAL ORGAN ISCHEMIA is a serious complication of acute aortic dissection, and delayed diagnosis can be lethal. Patients with ischemia may present with abdominal pain or distension. Clinical diagnosis is mandatory, and imaging and laboratory findings play a critical role in confirmation of the diagnosis and choice of treatment. We report a case of visceral ischemia requiring emergency intimal fenestration of the abdominal aorta based on serial monitoring of laboratory findings.

CASE REPORT

A 56-YEAR-OLD MAN PRESENTED with a sudden severe abdominal pain 13 days after the onset of type B acute aortic dissection. Chest computed tomography (CT) revealed type B aortic dissection, and the true lumen was narrowed by the expanding false lumen (Fig. 1). Chest and

abdominal CT on admission showed no blood flow disturbances of the true lumen and visceral arteries. Blood flow through the celiac trunk, superior mesenteric artery, and left renal artery was reduced, but blood flow through the distal abdominal aorta and the bilateral femoral arteries was clearly recognized. Laboratory findings showed a white blood cell count of 7,800/ μ L and elevations in blood urea nitrogen (BUN; 25 mg/dL), serum creatinine (2.05 mg/dL), aspartate aminotransferase (AST; 47 mU/mL), alanine aminotransferase (ALT; 52 mU/mL), and lactate dehydrogenase (LDH; 236 mU/mL). Three hours after admission, further increases were seen in BUN (to 26 mg/dL), creatinine (to 2.44 mg/dL), AST (to 80 mg/dL), ALT (to 91 mg/dL), and LDH (to 394 mU/mL). Seven hours later, BUN was 31 mg/dL, creatinine was 3.38 mg/dL, AST was 604 mg/dL, ALT was 775 mg/dL, and LDH was 1,361 mU/mL. Although the abdominal pain persisted, both femoral arteries were fully pulsatile and the patient had no leg ischemia. Urine output was preserved, and there was no hematuria. We decided to perform emergency surgery for acutely developing visceral ischemia.

We approached the abdominal aorta through a median laparotomy. The small intestine was ischemic but did not reveal necrotic changes. Intraoperative ultrasound confirmed that the abdominal aorta below the renal artery was narrowed because of compression by the false lumen. An abdominal aortic clamp was placed just below the inferior mesenteric artery and above the aortic bifurcation. The intimal flap below the inferior mesenteric artery, measuring 1 cm², was

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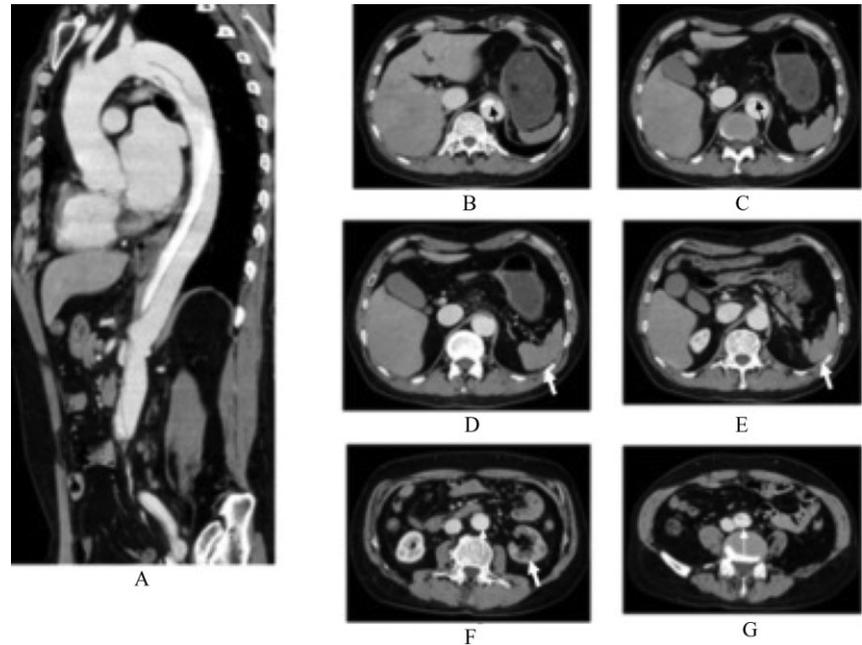


Fig. 1. Preoperative chest and abdominal computed tomography in a 56-year-old man with sudden severe abdominal pain 13 days after the onset of type B acute aortic dissection. The intimal flap is seen to extend from the descending aorta to the abdominal aorta (A,B,C,G). The upper abdominal aorta is occluded by the false lumen (D). Blood flow through the celiac trunk and superior mesenteric artery is obstructed (E). Left kidney blood flow is diminished (F). Ischemic change is also seen in the spleen (B–E). Distal aortic blood flow via the false lumen is clearly seen (G).

resected by a transverse incision of the abdominal aorta. There was no clot in the false lumen, and the aortic incision was closed. Intraoperative ultrasound revealed that the blood flows to the spleen and bilateral kidneys were regained. The patient's postoperative course was uneventful. Elevated enzymes gradually returned to normal levels by the 17th postoperative day. Computed tomography carried out immediately postoperatively showed that blood flow had resumed in the intra-abdominal arteries, but blood flow to the left kidney was still reduced 16 days after the operation (Fig. 2). Levels of BUN and creatinine were 18 and 1.57 mg/dL, respectively, on the 17th postoperative day.

DISCUSSION

AORTIC DISSECTION CAN place patients at risk for organ ischemia, which can start at the onset of dissection or later in the disease course^{1,2} and have lethal sequelae. Increased awareness of this complication, and the availability of better diagnostic tools, may improve the survival rates of patients with visceral ischemia. Ito and colleagues concluded that previous abdominal aortic aneurysm graft replacement was a risk factor for infradiaphragmatic malperfusion in patients with acute aortic dissection.³ Diagnostic procedures include CT,^{1,3–5} ultrasound,¹ and laparoscopy.⁶ Organ ischemia owing to aortic dissection often requires emergency surgery for rapid restoration of blood flow to the true lumen. Various treatment options are available today, including catheter inter-

ventions such as catheter fenestration, endovascular aortic repair,^{7,9} and conventional open surgery. The most appropriate method should be chosen and implemented without delay. In this particular instance, we choose endovascular surgery limited to elective surgery because of a lack of endovascular stent grafts for emergency operation. Thus, we chose open surgery in this case.

Our patient developed visceral organ ischemia 13 days after the onset of the dissection. Yamashiro and colleagues reported a case of delayed perfusion of the viscera and bilateral lower extremities after a Bentall procedure for type A acute aortic dissection.⁴ Their patient developed delayed-onset organ ischemia 8 days postoperatively that may have resulted from changes to the vasculature and blood pressure. The absence of leg ischemia in our patient led us to presume that re-entry was below the distal abdominal aorta but to delay our decision to intervene surgically. However, rapid increases in several blood parameters, including transaminases, were important factors in our decision to perform an emergency operation. Serial monitoring of laboratory findings was the key for the adequate treatment in our case.

CONCLUSIONS

WE EXPERIENCED A case of delayed visceral organ ischemia, without leg ischemia, induced by a type B acute aortic dissection. Rapid elevation in transaminases led

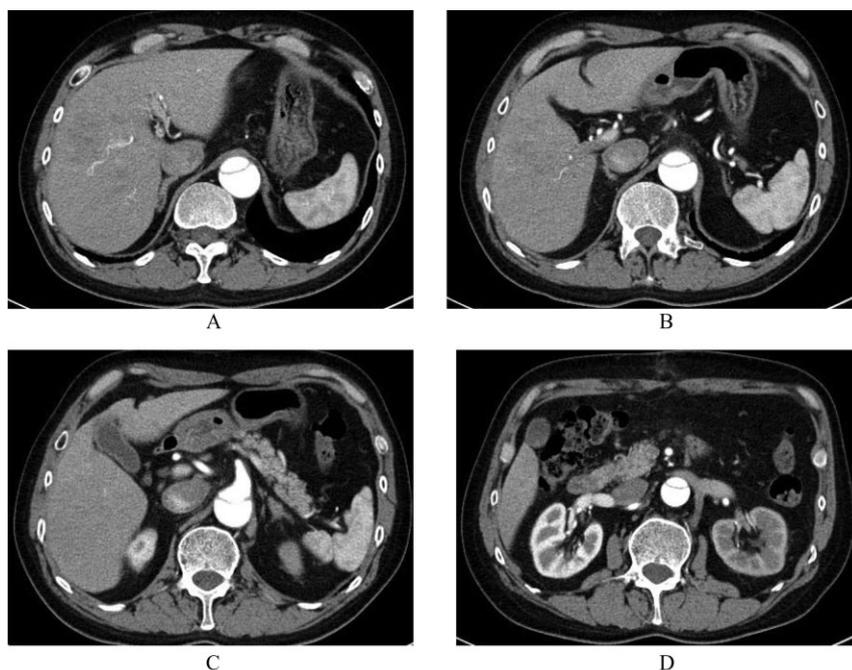


Fig. 2. Postoperative abdominal computed tomography in a 56-year-old man with delayed visceral organ ischemia, induced by a type B acute aortic dissection, treated by emergency fenestration. The intimal flap is visualized in the abdominal aorta (A–D). The true lumen is patent, and blood flow to the spleen is clearly visible (A–C). Blood flow to the left kidney is diminished (D).

to our decision to perform emergency fenestration, and we achieved good clinical results.

CONFLICT OF INTEREST

MISAWA Y SERVES as a consultant to Terumo Co. and Edwards Lifescience Co.

REFERENCES

- Orihashi K, Ozawa M, Takahashi S *et al.* Treatment strategy for acute type A aortic dissection complicated with organ ischemia. *Ann. Vasc. Dis.* 2011; 4: 293–8.
- Murashita T, Ogino H, Matsuda H *et al.* Clinical outcome of emergency surgery for complicated acute type B aortic dissection. *Circ. J.* 2012; 76: 650–4.
- Ito T, Kawaharada N, Kurimoto Y *et al.* Infradiaphragmatic malperfusion of acute aortic dissection associated with previous abdominal aortic aneurysm repair. *Surg. Today* 2013; 43: 1019–24.
- Ogino H. [Aortic dissection with ischemia of the abdominal organs.] *Kyobu Geka* 2012; 65: 653–9. (In Japanese.)
- Yamashiro S, Kuniyoshi Y, Kise Y, Arakaki R. Delayed visceral malperfusion after Bentall procedure for type A acute aortic dissection. *Interact. Cardiovasc. Thorac. Surg.* 2012; 15: 794–6.
- Ferlan G, Lospalluti M, Capone G, De Pasquale C. Mesenteric ischemia in a patient with an acute aortic dissection type A. One-step repair of the aortic and visceral lesions. Role of laparoscopy for timely diagnosis and treatment. *Interact. Cardiovasc. Thorac. Surg.* 2011; 12: 835–6.
- Midulla M, Fattori R, Beregi JP, Dake M, Rousseau H. Aortic dissection and malperfusion syndrome: A when, what and how-to guide. *Radiol. Med.* 2013; 118: 74–88.
- Narita K, Akutsu K, Yamamoto T *et al.* Simultaneous fenestration with stent implantation for acute limb ischemia due to type B acute aortic dissection complicated with both static and dynamic obstruction. *Ann. Thorac. Cardiovasc. Surg.* 2012; 18: 158–61.
- Sfyroeras GS, Rubio V, Pagan P, Diethrich EB, Rodriguez JA. Endovascular management of malperfusion in acute type B aortic dissection. *J. Endovasc. Ther.* 2011; 18: 78–86.